Deterioration of the informal tank institution in Tamil Nadu: caste-based rural society and rapid economic development in India

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Deterioration of the Informal Tank Institution in Tamil Nadu: Caste-based Rural Society and Rapid Economic Development in India

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Abstract

The informal tank institution seems to have functioned relatively well in Tamil Nadu, India, at least until the early 1970s. The institution had been supported by three layers of irrigation functionaries at village level. Especially important was the role of the lower irrigation functionaries such as the water-turner (*Neerkatti*), who had been conducting important tasks such as sluice operation, field water management and others. Based on the authors' recent field survey in seven tank-benefitted villages in Madurai District of Tamil Nadu, especially interviews with 31 *Neerkatti* families, after discussing physical and socio-economic factors which caused the deterioration of tank irrigation and the village-level informal tank institution, the paper focuses on the current status of institution, including how rules and regulations, and the sanction system on violators and related systems are functioning, and analyzes the current socio-economic status and perceptions of the *Neerkattis*. It emphasizes the contradiction between the traditional caste-based society, which governs the informal tank institution, and the recent rapid economic development in India.

Keywords: informal tank institution, *Neerkatti*, caste, economic development, Tamil Nadu

Introduction

The interruption of the southwest monsoon by the Western Ghats Mountains makes the climate of south India semi-arid, except Maravar coasts. Tanks (water reservoirs) for irrigating paddy field, therefore, are a common feature of the south Indian cultural landscape. In Tamil Nadu, for instance, there are more than 39 thousand tanks at present, many of which were built in the 18th and 19th centuries by kings and *zamindars*, and even by British rulers [Palanisami and Easter 2000: 9]. With some exceptions such as the Kaveri River Delta, irrigated paddy production came to be possible only by constructing tanks, replacing the hitherto long-fallow slash and burn combined with pastoralism and forest-based

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livelihoods [Mosse 2003: 61]. In the case of southern Tamil Nadu, before the British rule, expanding tank irrigation and the interlinking of isolated tanks (and villages) through new channels or diversions brought socially diverse settlers into hydrological, economic, and political units at higher levels under the authority of Maravar warrior chiefs [Breckenridge 1985: 45]. The prosperity level and the size of the villages in semi-arid regions of south India were directly proportional to the size and performance of irrigation tanks [Someshwar 1999].

Tanks, as common property, were inextricably linked to the social web of rural life and have been predominantly managed by informal institution with local customs and norms. The institution has long been practiced by the people continuously to address inherent uncertainties of the common resources. However, tank irrigation has been reducing its importance after the independence of India, especially since the 1960s, when groundwater irrigation through the installation of wells started to grow rapidly. During the 1950s, nearly 40% of net irrigated area in Tamil Nadu were irrigated by tanks, but presently this figure has decreased to less than 20%, while the share of wells increased from around 25% to nearly 50% [Palanisami and Ester 2000: 28]. Along with this, although the informal tank institution seems to have functioned relatively well at least until the early 1970s, it started to malfunction thereafter, and its deterioration seems to have accelerated after the mid-1990s, when influences of urbanization began to be felt more directly and intensively in rural areas.[1)]

One of the major factors which caused the deterioration of informal tank institution was the introduction of private wells, because it enabled farmers to reduce their dependency on tanks [Kajisa *et al.* 2007]. The influence of urbanization, on the other hand, increased especially since the mid-1990s, and caused 1) the shift of occupational structure from farming (including agricultural labor) to off-farm activities, with increased migration to urban areas and increased wage rate in agriculture, and 2) the accelerated encroachment of tank foreshore by factories, public buildings, residences for sub-urban

1) However, we need to be reminded that "in purely physical terms tanks are not stable structures and require constant re-building. . . . And unlike river irrigation, investment in tanks was always risky, carrying uncertain returns. . . . At any historical point, therefore, a significant proportion of tanks would have been in disrepair or abandoned" [Mosse 2003: 83]. Early 19th century surveys by the British, for instance, classified up to 30% of tanks as "unusable" [*ibid.*: 82]. Therefore, if we consider that tank systems started to deteriorate only recently, it is totally contrary to the historical facts. Another major illusion widely shared is the image of autonomous villages and the stable resource management of tanks by such village communities. "Dealing with the uncertainties of tank-irrigated agriculture . . . has always involved institutions well beyond the village. From medieval times, this form of agriculture has involved risks—the devastation of floods or warfare, the risk of drought or shortage from a neglect of tanks—and has demanded investment (in maintenance and repairs) which are beyond the capacity of communities of cultivators" [*ibid.*: 5]. "The pre-colonial state was redistributive in the sense that through gifting villages and tanks, tax-free land grants and a share revenue system, a significant proportion of the surplus notionally extracted by the state was fed back into irrigation maintenance and agricultural production" [*ibid.*: 80].

people, or others. The informal tank institution has come under tremendous pressure because of state and market intervention, person-oriented political patronage and political encouragement of encroachment [Nadkarni 2000].

The major objective of this paper, based on recent field survey in seven tank irrigated villages in southwestern part of Madurai District of Tamil Nadu, is to delineate the current status of tank irrigation and the informal tank institution, and to clarify in detail the factors which caused the deterioration of tank systems. Special emphasis will be made on the changing role of the water-turners, *Neerkattis*, key persons in such an informal tank institution; they have been playing vital roles such as distributing water equitably through sluice operation, mediating disputes among farmers, facilitating water supply to tanks, organizing and coordinating mobilized labor for tank maintenance and lobbying the government for better tank management [Palanisami and Balasubramanian 1998]. They are the specialists in water management, having rules to allocate water in times of scarcity, on the basis of detailed knowledge of the needs of individual wetland fields, thus mitigating usual tension between head and tail-enders [Mosse 2006]. The discussion on *Neerkattis* is critical, considering the services they render to informal tank institution.

However, *Neerkattis* have been hired from some particular scheduled caste (SC) families with a hereditary system. The informal tank institution has been a caste-based hierarchical system, governed by upper caste people but actually implemented by SC people. The traditional system often functions as an institution of upper caste dominance and a vestige of a much wider set of caste-based privileges and rights over village resources [Mosse 1997]. Therefore, the informal institution has often been criticized on account of its being invented and manipulated, its gender bias and caste orientation, and its abuse of power in the changing socio-economic scenario. The increasing tension and conflict among upper and lower castes in recent years is one of the most important reasons for the recent deterioration of informal tank institution, as Mosse [2006] described in detail in one of his study villages, Vayalur, located in the upper part of Saruganj minor basin where water was (and had been until very recently, i.e., the mid-1990s) controlled, through sophisticated water rationing systems.[2)]

Our study area (southwestern part of Madurai District) belongs to the same type of area as that to which the Vayalur Village belongs, where tanks have been functioning relatively well until very recently. We will describe and analyze how the informal tank institution deteriorated even in such an area,

2) In 56 out of the 57 villages surveyed in the upper part of the catchment, water was controlled [Mosse 2006]. "By contrast, in the management of every one of the 22 tanks surveyed in the lower part of the catchment such institutions were today (in the mid-1990s) wholly absent" [Mosse 2003: 219]. Mosse made an interesting argument regarding the reasons for the difference between the two regions. See chapter 7 of Mosse [2003] for details.

focusing on the resistance and challenge posed by the hitherto subordinated untouchables (SC people) against the hierarchical caste-based management system of tanks, just as Mosse [2006] did in his study village. However, the major differences between Mosse's work and ours are: 1) our analysis of the factors behind the deterioration of the informal tank institution as well as its current status will be much more in detail and comprehensive than that provided by Mosse; and 2) whereas Mosse dealt with the period until the mid-1990s, we will extend the period up to the late-2000s, considering that after the mid-1990s urbanization started to be felt more directly in rural Tamil Nadu, which seemed to have accelerated the deterioration of informal tank institution. Our focus of analysis will not only be confined to inter-caste conflicts but also extended to various other factors, including economic and socio-political ones.

The composition of the paper is as follows. The next chapter identifies the factors and mechanisms behind the recent deterioration of the informal tank institution. The second chapter presents an outline of the study villages and tanks. The third chapter delineates the current status of the informal tank institution in the study villages. The fourth chapter discusses the determinants of the performance of the informal tank institution. The fifth chapter shows the current status and perceptions of the *Neerkattis* in the study village. And finally, we conclude.

I　Factors and Mechanisms behind the Deterioration of Tank Irrigation

A tank is a water reservoir, which is constructed by building a crescent-shaped bund along the contour line. The channel(s) to collect rainfall water and/or stream water from the upper basin is called a supply channel. Each tank has a sluice (often more than one), from which stored water is taken out and, through field channels, distributed to paddy field located in the lower side of the tank. Tanks usually have no water in the lean season, but after the northeast monsoon starts, they collect water from the upstream area and the water level gradually rises. Once a tank is full, the sluice is opened (but remains closed during the night and the rainy days) and the paddy field is irrigated. Even after utilizing the entire water in the tank, if the tank stores water in another round, farmers can use it for additional cropping. The sluice operation and the filed water management and distribution, the most important tasks in tank irrigation, were carried out by *Neerkattis*, traditionally selected from a particular SC in a hereditary system. They were paid in kind (paddy) by farmers according to the irrigated area. Tanks have surplus weirs, through which excess water flows to the downstream, thereby protecting the tank bunds from breaching. The tanks and small streams in a river basin are complexly interconnected and the surplus water of one tank goes to the other downstream-located tank or to the stream again.

At present, in Tamil Nadu, there are many open wells in the command area (*ayacut*) of tanks as well as in dry land. The wells were usually dug long before, and groundwater used to be lifted by bullock power. However, since the 1970s (in the case of Madurai District), with the introduction of electrified motor, the groundwater level went down rapidly, and well owners were obliged to dig deeper and deeper open wells, before bore-wells were finally introduced, in which tubes were inserted from the bottom of open wells to a deeper site (sometimes horizontally) to get deeper groundwater. Thus groundwater could be lifted much more efficiently, although well owners had to drill wells deeper and deeper to compensate for the declining groundwater level. Such developments in groundwater irrigation reduced the reliance of farmers on tank water. However, even well owners continued to use tank water when it is available, and more fundamentally, since groundwater is basically recharged by tanks, tanks cannot be totally neglected.

Given the basic technical information on tank irrigation aforementioned, let us now explain the major points of Fig. 1,[3] which summarized the factors and mechanism behind the recent deterioration of the informal tank institution, based on literature review as well as our own research experiences.

I-1. *Frequent Monsoon Failures in the First Half of the 2000s*

In the study area, in 3–5 years out of every 10, tanks fail (with no water at all) and in 2 years tanks under-perform (with insufficient water for irrigating all the command area). In other words, only once in 3 to 5 years do tanks perform well. The effects of the severe droughts experienced in the study area during the first half of the 2000s[4] cannot be overlooked, because many farmers became so disappointed that they finally decided to abandon their farmland (including land in command area) and leave it fallow, resulting in the intrusion of a thorny shrub called *Prosopis juliflora*. And since the removal of this shrub was very difficult, many farmers were obliged to let the tree grow and cut it once in 2 to 3 years to sell it. Severe droughts accelerated the already progressive exit from agriculture by farmers in the area, following the rapid development of non-agricultural sectors. Needless to say, the accelerated job shift of the irrigation functionaries such as *Neerkattis* also greatly damaged the informal tank institution.

I-2. *Consequences of Diffusion of Energized Wells*

The diffusion of energized (electrified) wells led to the declining importance of tanks for farmers (even though there is an aforementioned connectivity between tank water and well water). The energized

3) Caste discrimination and the resulting conflict among different caste group, one of the important factors, will be discussed later in the article.

4) See Fujita [2011] in this issue.

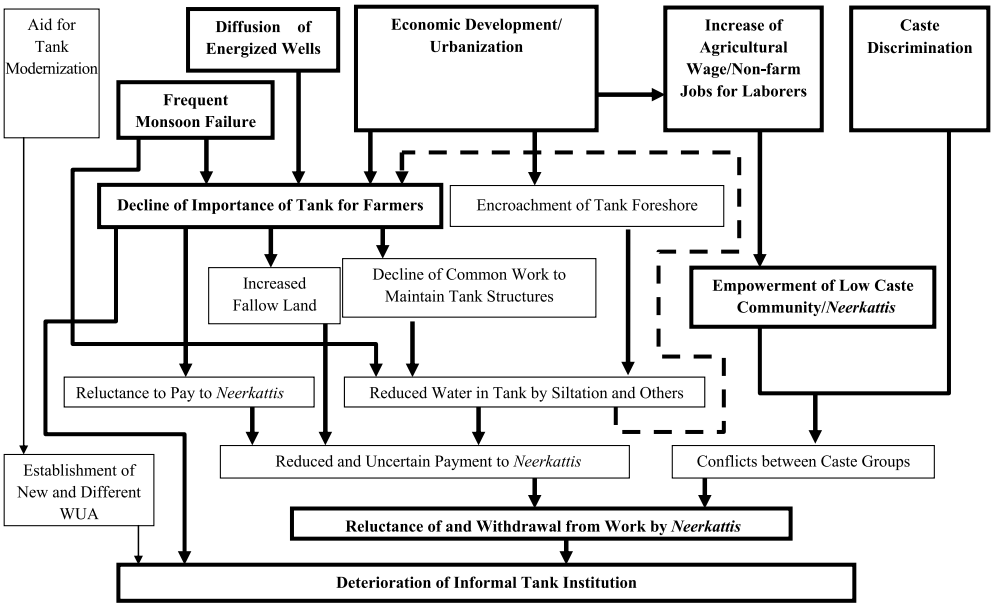


Fig. 1　Factors and Mechanism of Deterioration of the Informal Tank Institution

wells enabled well owners to reduce their reliance on tank water, thereby making them reluctant to participate in common work for tank maintenance (such as cleaning supply channels, field channels and strengthening tank bund before starting the tank season) and even pay remuneration to *Neerkattis* and other irrigation functionaries. The declining trend of common work for tank maintenance caused the deterioration of tank structures and reduced water storage in the tank, which again resulted in decreased reliance of farmers on tank water (and more on well water) on the one hand, and an accelerated exit from agriculture, which increased fallow land and, in a vicious cycle, reduced the number of farmers who participate in common work, on the other hand. Reluctance to pay remuneration to *Neerkattis* contributed directly to the deterioration of the informal tank institution.

I-3. *Encroachment of Tank Foreshore and Siltation of Tanks*

Encroachment of tank foreshore has progressed for various reasons. One was the reclamation of foreshore land for cultivation purpose. Another reason was the development of factories, residential areas and others for non-agricultural purposes. A third reason was the development of infrastructure such as road and check-dams. The impact of the encroachment of tank foreshore seems to be very large, because it sometimes induced a sharp reduction in the amount of stored water in the tanks. Moreover, the capacity of tanks to store water is reduced as well by gradual siltation. Note that dredging soil to

use it for manuring farmland is not attractive because only the surface soil is fertile. About 10–20% of water storage area has been encroached on average, and tanks lost about 30% of their storage capacity [Palanisami and Easter 2000: 12]. Therefore, even though rainfall is good enough to provide necessary water, tanks are usually not in a position to store enough water, which further aggravates the uncertainty of water storage in tanks.

I-4. *Development of Non-agricultural Sectors and Migration to Urban Areas*

The most fundamental factor behind the deterioration of the informal tank institution in recent years was the overall economic development in the study area, especially the development of non-agricultural sectors, which precipitated the declining importance of agriculture as a source of income, the increasing shift to non-agricultural jobs, and migration to urban areas. The occupational shift is most prominent among the younger generations. An inevitable result is reduced labor participation in common work for tank maintenance, especially what requires large-scale labor mobilization. The sanction system against violators of rules and regulations also weakened. Reduced common work, in addition to the encroachment of tank foreshore, caused the drastic reduction of water storage in tanks, which lowered the profitability of paddy cultivation and thus accelerated farmers' exit from agriculture. Such a shift to non-agricultural jobs again reduced farmers' incentives to participate in common works, thereby creating a vicious circle.

Under such circumstances, especially the reduced storage capacity of tanks, it was quite natural that villagers such as *Neerkattis* who had been earning their livelihood on tank-related work became increasingly reluctant to continue their works because their income depended on the performance of tank irrigation (and moreover, they did not even have any income when tank failed during severe drought). More importantly, under rapid economic development and the resulting wage surge in India (including the study area), *Neerkattis* and other irrigation functionaries who belong to SC can now more easily find alternative jobs in factories or construction sites, or others that offer more attractive and stable remuneration. In addition, through their accumulated wage income, they started to mortgage-in or even purchase farmland and operate the land by themselves.

I-5. *Negative Effects of the Government Program*

Sometimes the deterioration of informal tank institution is, ironically, caused by the efforts of government programs to improve/modernize tank structures. In the study area, especially, tank modernization program financed by the European Economic Community (EEC) was carried out during the first half of the 1990s. The first phase was from 1989 to 1991 and the second phase from 1993 to 1995. Since the

establishment of the formal Water Users' Association (WUA) was mandatory for this program, problems arose because in some villages the officials from the Public Works Department (PWD), responsible for large-scale tanks with more than 100 acres of command area (*ayacut*), formed a totally new WUA without considering the existing informal institution. This lead to the deterioration of both formal and informal institutions, owing to the neglect of the WUA by the PWD after the project was over (as argued later in this paper).

II Outline of the Study Area and the Tanks

Now let us move to the empirical study. Seven villages from Peraiyur *Taluk* of Madurai District, approximately 60 km southwest from Madurai City (Fig. 2), were selected for study. The Peraiyur *Taluk* is located in the western-most part of the Madurai District, just at the foot of the Western Ghats Mountains; i.e. the rain shadow region with an average rainfall of only 700 mm (the same figure in Madurai District ranges from 700 to 1,150 mm). However, it should also be noted that the study villages are located in the uppermost part of the river basin and their tanks thereby benefit from the water directly, or nearly directly, flowing from the Western Ghats Mountains.

As Fig. 2 illustrates, the 7 villages are concentrated in a narrow geographical area in the southeastern part of the *Taluk* and belong to 5 *gram panchayats* (GP, hereinafter): 2 villages belong to a GP and the other 2 villages belong to another GP, while the remaining 3 villages belong to the other different GP respectively (Table 1). The relation between GP, villages and tanks is sometimes complex and in the case of our study area, the tank in Koovalapuram Village benefits other 2 villages under the same GP. The tank in Silaimalaipatti Village also benefits another village under the same GP, whereas Jariusilampatti Village is benefited by two tanks, which are, however, managed by the same informal tank institution in the village.

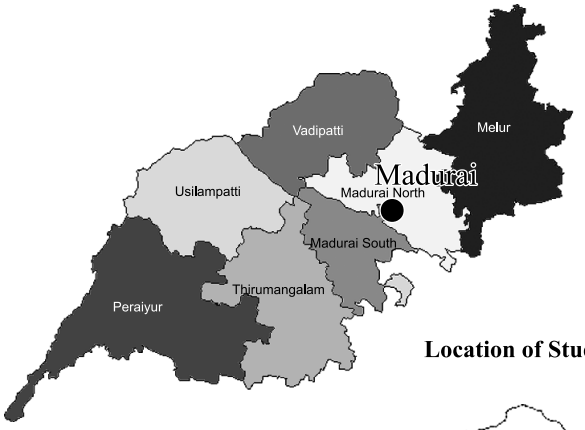
Table 2 shows the basic population characteristics of the 7 study villages. As the table shows, Meenachipuram and Jariusilampatti are typical cases of single-caste (*jati*) villages,[5] whereas Koovalapuram, Kadaneri, Silaimalaipatti and Sittuloti are multi-caste villages.[6] The informal village governing system in multi-caste villages is complicated compared to single-caste ones. In Koovalapuram, for instance, there were seven caste groups, and the five caste groups except *Vannan* and *Sakkiyar* had

5) Single-caste villages include not only purely single-caste villages, but also villages with a dominant caste group and several very minor groups.

6) In the village Kadaneri, however, the SC people (194 households out of total 387 households) live in a part of the village that is called Keela Karaderi and distinguished from the other parts of the village called Mela Kadaneri. But geographically these two "villages" are not separated.

Location of Madurai District in Tamil Nadu

Location of Peraiyur *Taluk* in Madurai District



Location of Study Villages in Peraiyur *Taluk*

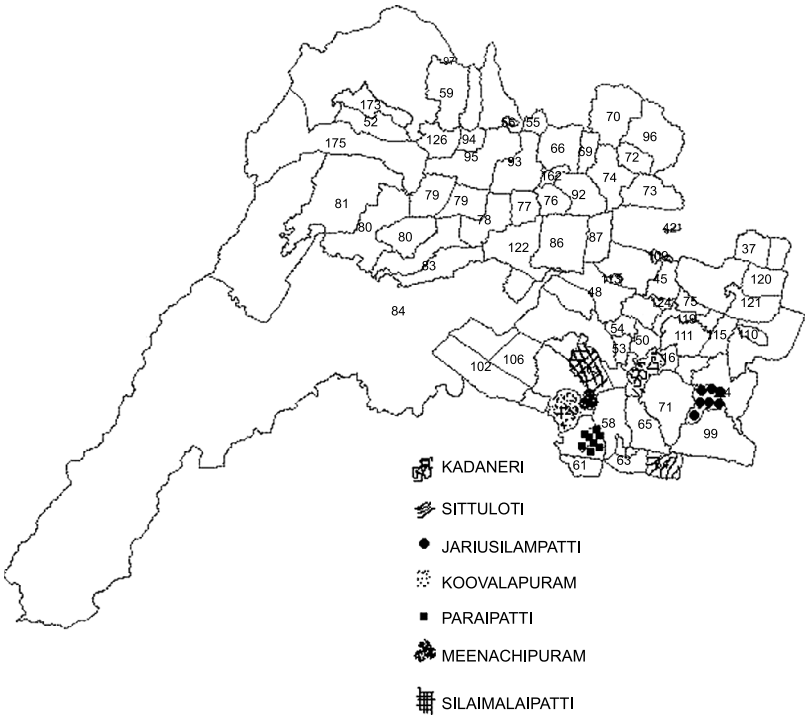


Fig. 2 Map of the Study Area

Table 1　The Study Villages and Tanks

Name of the Village	Name of the *gram panchayat*	No. of Villages in the *gram panchayat*	No. of the Tanks in the *gram panchayat*	No. of Tank Selected from the Village	No. of Villages Benefitted from the Selected Tank
Koovalapuram	Koovalapuram	4 (Koovlapuram, Meenachipuram, K. Pudupatti and Chinnayapuram)	2	1	3 (Koovlapuram, Chinnayapuram and K. Pudupatti)
Meenachipuram	Koovalapuram	Same as above	2	1	1
Kadaneri	Kadaneri	1	1	1	1
Silaimalaipatti	Silaimalaipatti	4 (Silaimalaipatti, Pappureddipatti, Colony and Pokklapatti)	1	1	2 (Silaimalaipatti and Pokklapatti)
A. Paraipatti	Sithilothi	5 (Periaya sithilothi, China sithilothi, A. Paraipatti, Kavetnayakkan patti and Jariusilampatti)	5 (each village has one tank expect Jariusilampatti which has 2 tanks)	1	1
Jariusilampatti	Sithilothi	Same as above	Same as above	2	1
Sittuloti	Sittulotti	1	1	1	1

Source: Field survey in June 2008.

Table 2　Population Characteristics of the Study Villages

Name of the Village	No. of Households	Population	No. of Caste	Name of Caste (No. of Households)
Koovalapuram	133	520	5	*Reddiyar* (56), *Asari* (4), *Pandaram* (6); *Devar* (5); *Pallar* (57), *Vannan* (3), *Sakkiyar* (2)
Meenachipuram	110	440	2	*Yadava* (95); *Sakkiliyar* (8), *Vannar* (7)
Kadaneri	387	2,234	9	*Pillai* (4); *Gounder* (50), *Naidu* (60), *Yadava* (35), *Muthaliyar* (35), *Asari* (5), *Chettiyar* (4); *Pallar* (174), *Parayar* (5), *Sakkiyar* (5), *Vannar* (5), *Arunthatiyar* (5)
Silaimalaipatti	285	1,885	8	*Chettiyar* (78), *Asari* (55), *Yadava* (75), *Naidu* (10); *Devar* (1); *Paraiyar* (6), *Sakkiliyar* (60)
A. Paraipatti	183	710	3	*Iyer* (10); *Naidu* (20); *Moopar* (15); *Pallar* (138)
Jariusilampatti	112	445	2	*Pallar* (110), *Sakkiliyar* (2)
Sittuloti	130	510	3	*Yadava* (53); *Devar* (40); *Pallar* (37)

Source: Field survey in June 2008.

Note: The official category of each caste group listed in the table is as follows. FC (Forward Caste)- *Iyer*, *Pillai*; BC (Backward Caste)- *Reddiyar*, *Asari*, *Pandaram*, *Gounder*, *Naidu*, *Yadava*, *Muthaliyar* and *Chettiyar*; MBC (Most Backward Caste)- *Devar* and *Moopar*; SC (Scheduled Caste)- *Pallar*, *Paraiyar Sakkiyar*, *Sakkiliyar*, *Vannan*, *Arunthatiyar*, *Ambataiyan* and *Vettiyan*.

their own caste *panchayat*. The caste *panchayat*'s power range is limited to its caste boundary but it performs a wide range of collective activities such as dispute resolution, organizing religious ceremony, development of common resource base and social welfare. If problems common to the entire village arise, usually two leaders from every caste group meet at a common place to discuss over the issues.

Table 3 Basic Information of Tanks in the Study Villages

Name of the Village	Name of the Tank	*Ayacut* (acre) (A)	Cultivated Area in 2007 (acre) (B)	Ratio (%) (B)/(A)	No. of Sluices	No. of *Neerkatti* Families
Koovalapuram	Periya kanmoi	155	108	69.6	2	5
Meenachipuram	Akka kulam	35	10	28.6	1	3*
Kadaneri	Periya kanmoi	104	75	72.1	1	3
Silaimalaipatti	Oorkavalan kanmoi	70	31	44.3	2	3*
A. Paraipatti	Veppankulam	87.5	80	91.4	2	5
Jariusilampatti	Vagai kulam &Thankal kulam	85	53	62.3	2	4
Sittuloti	Periya kanmoi	109	95	87.2	2	8

Source: Field survey in June 2008 and Village Revenue Register from the Village Administrative Officer (VAO) in the locality.

Note: * *Neerkatti* families hailed from adjacent villages because there were no *Pallar* caste people in their own villages; in the case of Meenachipuram and Silaimalaipatti, they hailed from a nearby village named K. Pudupatti and Thummanayakkan, respectively.

An informal tank institution is usually organized in each tank, except for such cases as Jariusilampatti Village where 2 tanks are managed by the same institution. Besides, only villagers who own and/or manage farmland located in the *ayacut* of tank are the members of the institution. But if an informal tank institution is organized in a multi-caste village, the management of the institution usually becomes more difficult, as compared to a single-caste village. And if the tank water is shared among more than one village, as in the case of Koovalapuram and Silaimalaipatti, the problem becomes even more complex and difficult.

Table 3 provides basic information on the tanks in each study village. Among the 8 tanks (including 2 tanks in Jariusilampatti), 3 with more than 100 acre of *ayacut* are managed by the Public Works Department (PWD), whereas the remaining 4 with less than 100 acre are managed by the *Panchayat Union* (PU).[7] However, as already noted in the previous chapter, due to the deterioration of both the physical condition of the tanks and the performance of informal tank institutions attached to them, the tank-irrigated agriculture is facing serious problems in recent years in south India in general, including our study area. One evidence of such deterioration is the percentage of actual cultivated area in the total *ayacut* of each tank, as shown in Table 3; the percentage of land which has remained uncultivated ranged from 8.6 to 71.4%, with an average of 35%. Once such fallow land is infested by the *Prosopis juliflora*, and the removal of the thorny shrub is so difficult that many farmers are obliged to let the tree grow and cut it once in 2 to 3 years for sale to such industries as charcoal making and brick making.

Note here that a *Neerkatti*, a hereditary position traditionally selected from the *Pallar* caste (one

7) The *panchayat* system in Tamil Nadu has three tiered structure; *gram panchayat*, *panchayat union* and *district panchayat*. Note here that the term "gram" literally means village.

of the most dominant SCs in the study area) families, is responsible for a sluice gate in a tank, conducting various important tasks such as sluice operation, field water management and distribution, and checking conditions of supply channel and tank bund, etc. Therefore, if a tank has two sluices, two *Neerkattis* work during the tank season, usually from mid-September to January in the study area. Table 3 shows the number of such *Neerkatti* families in each tank (Detailed discussion of the *Neerkattis* will be presented later in this article).[8] Paddy cultivation is predominantly practiced during the tank season in the area, which is followed by rain-fed millets, pulses or cotton cultivation. However, in recent years, due to 1) the physical deterioration of tanks, 2) the weakening of the informal tank institution, and 3) the harsh experience of severe droughts for 3 to 4 years in the first half of the 2000s, it is becoming difficult for farmers to follow the regular paddy-pulses/millets/cotton cropping patterns and farmers are losing livelihood opportunities in agriculture. In response, many farmers have abandoned the land and started migrating to the cities to seek job opportunities.[9]

III Functioning of Informal Tank Institution in the Study Villages

Although formal tank institutions called Water Users' Associations (WUAs) were found in some villages, no tank in the 7 study villages had a formal system to manage. But in actuality, according to our field survey in June 2008, all the villages had an informal institution to govern their resources in one form or another. Their working style, leadership selection and resource mobilization behavior varied from village to village and even from caste to caste within a village. There were largely three layers of irrigation functionaries. At the top there were persons who make decisions and enforce rules and regulations for tank issues and at the bottom there were those who execute the actual manual work such as sluice operation and field water management, and lastly in between the two were those responsible for administration works such as record keeping, account maintenance and negotiation (Table 4).

The table shows that *Maniyam* in Koovalapuram and *Nattamai* in other villages acted as upper level irrigation functionaries.[10] Their basic roles were decision-making and enforcement of rules and regulations. They were responsible not only for the tank issues but also all the other important village

8) Usually the number of *Neerkatti* families exceeds the number of sluices, and for this reason, the *Neerkattis* usually work on a rotational basis.

9) In the last 10 years, 0.35 million people have emigrated from Madurai District alone in search of jobs in cities such as Coimbatore, Tirupur and Chennai, and even as far as north India [Vikatan 2009]. Of course, tank failure was not the only reason for such migration.

10) *Maniyam* and *Nattamai* had the same roles, the difference being only in the local name, as Koovalapuram Village was dominated by *Reddiyar* caste people who migrated long ago from the state of Andra Pradesh.

Table 4 Three Levels of Irrigation Functionaries in the Study Villages

Name of the Village	Local Name of the Irrigation Functionaries (upper line) and the Caste Groups (lower line)				
	Upper Level	Middle Level	Lower Level		
			1st Category	2nd Category	3rd Category
Koovalapuram	*Maniyam*	*Kanakku pillai*	*Madaiyan*	*Thotti*	–
	Reddiyar	*Reddiyar*	*Pallar*	*Pallar*	–
Meenachipuram	*Nattamai*	–	*Neerkatti*	*Thotti*	–
	Yadava	–	*Sakkiliyar*	*Sakkiliyar*	–
Kadaneri	*Nattamai*	*Kanakku*	*Neerkatti*	*Thotti*	*Kaval**
	Gounder, Pallar	*Pillai, Muthaliyar*	*Pallar*	*Sakiliyar*	*Pallar*
Silaimalaipatti	*Nattamai*	*Pokkistari*	*Neerkatti*	*Thotti*	*Kulathu kaval**
	Chettiyar, Asari	*Yadava*	*Pallar*	*Sakkiliyar*	*Pallar*
A. Paraipatti	*Nattamai*	*Kaladi, Variyar*	*Neerkatti*	*Thotti*	–
	Moopar, Pallar	*Pallar*	*Pallar*	*Pallar*	–
Jariusilampatti	*Nattamai*	*Kaladi*	*Neerkatti*	*Thotti*	*Kulathu kaval**
	Pallar	*Pallar*	*Pallar*	*Sakkiliyar*	*Pallar*
Sittuloti	*Nattamai*	*Kankani*	*Neerkatti*	*Neerpachi*	*Kanmoi kudumban**
	Yadava	*Devar*	*Pallar*	*Pallar*	*Pallar*

Source: Field survey in June 2008.

Note: The roles and tasks of each level functionary are as follows:
Upper level: Decision-making and enforcement of rules and regulations.
Middle level: Record keeping, account maintenance and negotiation.
Lower level: Sluice operation, field water management and other manual work. The third category responsible for watching and guarding tank assets marked by * is not employed at present and *Neerkattis* are expected to do the guard work.

matters such as the celebration of festivals. They actually undertook tank-related works as one of the tasks of informal village leaders. In the middle level there were *Kanakku (pillai), Pokkistari, Kankani, Kaladi* or *Vaiyar*, who worked as administrators in all the village matters, and were sometimes employed as middle level irrigation functionaries if the budget of village-level common fund allowed it. They assisted the village leaders in accounting, record keeping and negotiation.[11] Relatively educated and well-informed persons were selected. Finally, at the lower level, there were *Neerkattis* (or *Madaiyans*)[12] in the first category; *Thotti* and *Neerpachi* in the second category; *Kulathu kudumban, Kaval* and *Kulathu kaval* in the third category. *Neerkatti* played the most important role in the tank system such as sluice operation and field level water distribution and management. Without *Neerkatti*, it is very difficult to

11) Except *Kankani* (it literally means "supervise") in Sittuloti, who supervise lower-level workers, all of the middle-level irrigation functionaries played the same roles, the difference being in local names only, as with the upper level functionaries.

12) *Neerkatti*, who traditionally worked for water distribution, can be found in various parts of India. In Andhra Pradesh, Tamil Nadu and Karnataka they are called *Neerkatti*; *Kollau, Chowkidars* and *Thekedars* in Uttranchal and Bihar; *Havaldar, Jagliyas* and *Patkaris* in Maharashtra; *Chudpun* in Ladakh, Kashmir. About details, see Down to Earth [2003], Sengupta [1985], and Narayanamoorthy and Deshpande [2004].

maintain the tank system. *Neerpachi* usually assists *Neerkatti* for water distribution to farmers' field, but if *Neerpachi* is not available, the *Neerkatti* is expected to do the work. *Thotti* is another lower-level worker who assists *Neerkatti* in water distribution, but in addition, works as a scavenger, announcer and attendant of village cremation yard. *Kulathu kudumban, Kaval* and *Kulathu kaval* used to be responsible for watching over and guarding tank assets such as trees (tamarind, jamun, palmyra and others with economic value) and fish, a task which, however, gradually came to be carried out by the *Neerkattis* (but as explained later, even *Neerkattis* already stopped this work in the study villages).[13)]

It is evident from Table 4 that whereas the top layer of administration is vested with upper-caste people who are mostly large farmers, lower-level work which requires hard labor is given to the people of lower caste, especially SCs, who are usually laborers or marginal farmers. Note here that the *Pallars* (traditionally selected as *Neerkattis*) belong to SC but they are relatively in a better position in terms of asset and landholding compared to the other SCs such as *Sakkiliyar* and *Paraiyar*.

The norms and regulations in each stage of paddy cultivation in tank season observed in the study villages are presented in Table 5. Below is a more detailed description.

Before onset of monsoon: During August and September, after taking note of the initial rainfall, the village informal leaders request the *Neerkattis* to roam around the supply channel(s) to check its condition. The conditions of the tank bund and field channels are also checked. If there is a need for repair, the leaders ask the *Neerkattis* to announce to all the farmers who have farmland in the *ayacut* to gather in a stipulated date. In the meeting, they are requested to contribute labor for the necessary common repair work,[14)] which is usually allocated according to the size of landholding.[15)] Then all the farmers and nominated labors (hired by some famers, especially large farmers) assemble in a common place in the early morning of a predetermined date and proceed to work together. They usually clean the bushes and thorns and repair some breached parts in the supply channels. They also repair field channels and tank bund if necessary. The middle-level functionaries are responsible for arranging tea and snacks. The *Neerkattis* are responsible for noting down the names of farmers who are absent and conveying the information to the leaders. Absent farmers are subject to sanctions (as argued later).

13) The *Neerkattis* used to get 10% of the total revenue from tank assets. If some farmers were interested to lease tank assets, they used to approach the *Neerkatti* since he had a priority.

14) Such communal labor for tank maintenance is generally referred to as *kudimarāmat*. In the colonial era, it was widely held that local irrigation structures had always been maintained through the operation of *kudimarāmat* institutions and beginning with the Madras Compulsory Labor Act (1858), the government took a series of steps to enforce community maintenance of tanks and customary labor by law [Mosse 2003: 251].

15) In some cases, one (or more) male laborer is allocated to each farm household.

Table 5 Norms and Regulations in Informal Tank Institution

Period	Regulation Arrangement at Tank Level	Arrangement in the Study Villages
Before onset of monsoon (Aug.–Sept.)	1. Assessing condition of supply channel and tank structure by *Neerkatti* 2. Report to the village leaders and arrange *ayacut* farmers' meeting (if needed) 3. Fix the date for common work by mobilized labor (if needed)	All except for Koovalapuram, Meenachipuram and Silaimalaipatti
After starting monsoon but before crop cultivation (Sept.)	1. Monitoring and assessing the quantity of water received by the tank 2. Celebration of *Madai Pongal* 3. Open sluices and start cultivation	All except for Koovalapuram, Meenachipuram and Silaimalaipatti
Crop growing period (Sept.–Dec.)	1. Open sluices at 6 a.m. and close at 6 p.m. 2. Prohibition of irrigation at night time 3. Rotational system of irrigation	All except for Koovlapuram and Silaimalaipatti
During tank water shortage	1. *Oru Madai Patchal* (open only one sluice and closed the remaining, and irrigated directly by *Neerkatti*/*Neerpachi*/*Thotti*) 2. Restriction of water allocation to a limited area 3. The *Pangu* system of irrigation	1–2. All except for Koovlapuram, Meenachipuram and Silaimalaipatti 3. Only in Kadaneri and A. Paraipatti
After harvesting (Jan.)	1. Payment of remuneration to irrigation functionaries 2. Celebration of *Kathiraruppu Pongal* (harvest festival) 3. Leasing out tank bed for cultivation	All the villages

Source: Field survey in June 2008.

Before crop cultivation in the field: The *Neerkattis* keep watch over the water level of the tank. Once it crosses half of the full level (each tank has some identification mark such as a pillar or a standing tree), the leaders fix the date for a festival called *Madai Pongal*. It is the custom to offer prayer (such as goats) to the god located in the tank bund[16] before opening the sluices. The *Neerkattis* are responsible for its arrangement. After prayer, the *Neerkattis* open the sluices and farmers start rice cultivation. It should be noted that the key[17] to operate the sluice rests with the *Neerkatti*. One *Neerkatti* is appointed in each sluice and if the tank has more than one, the sluice for which each *Neerkatti* is responsible is rotationally[18] changed every year because the sluice located in the lower and deeper site can supply water for longer days, thereby accruing a larger income to the *Neerkatti* (since his income depends on

16) See Palanisami and Easter [1983: 61] for details.

17) Before the Tank Modernization Program by European Economic Commission (EEC) started in 1989, almost all the sluices in the tanks in Tamil Nadu were traditional types made of wood without sluice keys. The operation of traditional sluices needed special skills and was dangerous because *Neerkattis* had to dive into the deep water. There were many different types of traditional sluices existed such as *Pulikkan madai* (sluice opening just like eyes of tiger), etc. For details see Shanmugam and Gurunathan [2007].

18) In some cases, lottery is carried out to decide the responsible sluices.

the irrigated area) compared to the counterpart who is responsible for another sluice which is located in the upper site, thus resulting in an inequality of income among the *Neerkattis*.

Crop growing period: The sluices remain closed when irrigation is unnecessary such as on rainy days. Otherwise, the sluices are usually opened at 6 a.m. and closed at 6 p.m., which means irrigation at night time is prohibited. In addition, in order to secure equality among the fields in upper, middle and lower part of the *ayacut*, a rotational system of irrigation is practiced in many villages, especially for the second time irrigation after the first-filled water is exhausted. For example, if farmers in the head-end irrigate first in a year, then in the next year the tail-end farmers irrigate first. To guard the crops in the *ayacut* against grazing by livestock such as cow, sheep and goat is the *Neerkatti*'s duty.

During tank water shortage: The role of the tank institution becomes crucial when the tank receives less water than usual. Rules are carefully designed so that farmers understand how their contributions are related to their individual interest as well as the well-being of others. The *Neerkattis* are asked to regulate the distribution of water uniformly among the farmers. He usually adopts the following three methods to regulate water supply.[19] The first is called the *Oru Madai Patchal*, in which the *Neerkattis* keep the lowest sluice open and close the remaining sluices when the tank has more than one sluice. By taking water from one sluice, he can easily irrigate the farmers' fields uniformly. The second method is to restrict the irrigated area within the *ayacut*. There are several ways to restrict the irrigated area. Usually, a uniform area per household is fixed, which ranges from 1 to 2.5 acres, in a block relatively close to the head reach, thus benefitting all the farmers (in Kadaneri). In some cases, however, water sharing is based on the number of household members, instead of in proportion to the land owned by each household in which allocation of 0.5 acre per capita is made, but with a maximum of 2.5 acre per household (in Kadaneri and A. Paraipatti).[20] The tank system often exerts control over what crops should be grown as well as the area, to match water availability, which is not merely a way to distribute scarce water among all but a prudent way of ensuring social justice.[21] The third method is called the *Murai Pasanam* or *Pangu* system, in which the *Neerkatti* divides *ayacut* area into 4–10 *pangus* (share). One *pangu* is approximately 63 acre. Water is rotated among these *pangus* by the *Neerkattis*. They also restrict the number of irrigation according to the rules decided

19) In some villages in the study area, informal leaders request well-owners not to use tank water and to provide well water to nearby fields if they have surplus, although such a custom was not found in our study villages.
20) Note that a similar practice is also reported by Narayanamoorthy and Deshpande [2004] in Maharashtra.
21) See also Sakthivadivel *et al.* [2004].

Table 6 Sanctions in the Informal Tank Institution

Village	Violence	Sanctions
Koovalapuram	1) No-participation in common work	No sanctions
	2) Pilfering water from fellow farmers' field or tank	No sanctions
Meenachipuram	1) as above	Fine up to Rs.300–500
	2) as above	Bear cost of electricity for the temple for one year
	3) Grazing goat and/or sheep in the paddy field	Fine up to Rs.300–500
Kadaneri	1) as above	Pay double labor cost
	2) as above	Fine up to Rs.500
Silaimalaipatti	1) as above	Pay labor cost plus Rs.50
	2) as above	Bear expenses of the *Oor Kavalan* temple celebration
	4) Breaking surplus weir	One-year ban for cultivation
A. Paraipatti	1) as above	Contribute more labor in the next year's common work
	2) as above	Fine up to Rs.1,000
Jariusilampatti	1) as above	Pay double labor cost he failed to contribute
	2) as above	Fine up to Rs.500–1,000
Sittuloti	1) as above	Fine up to Rs.1,000
	2) as above	Bear oil expenses for the temples

Source: Field survey in June 2008

collectively by farmers. The *Neerkattis* have a very good knowledge of individual farmers' fields in terms of water absorption and retention capacity, so that they give water once in ten days, for example, to the field which has higher water retention capacity, and shorten the interval for the poor water-retention field.

After harvesting: After harvesting, the *Neerkattis* approach the beneficiary farmers immediately to claim their remuneration in kind. The *Neerkattis*, along with landless laborers involved in the harvest, celebrate a festival called the *Kathiraruppu Pongal* to thank their god for providing livelihood opportunities. When the tank becomes empty, the tank bed is leased out to some villagers for cultivation but priority is given to the *Neerkattis*.

There is a sanction system when farmers violate the norms and regulations, except in Koovalapuram (Table 6). Usually the village informal leaders, after receiving complaints from the concerned person, establish a committee for inquiry and appoint a separate committee composed of three persons to decide the punishment. The punishment depends on various factors such as the severity and the nature of the offence, the condition of the victim, the economic status of the offender, the previous offense history of the offender, the attitude of the offender towards the informal leaders, and so on. Offenders are

sometime requested to kneel before the committee as a form of public apology. In the most severe cases, the offender may receive the severest punishment such as ex-communication, social opprobrium and social ostracism,[22] in which villagers cut off all contact and even refuse to offer assistance for funeral and cremation. It should be noted here, however, that the effectiveness of ostracism as a weapon against severe violation depends on the degree of physical immobility of the concerned offender. At present, since mobility is much higher than before, the effectiveness of such sanctions has been significantly reduced.[23]

According to Table 6, failure to contribute labor for common work and pilferage of water is commonly observed as the major violence. In the former case, the offender has to pay a fine that is larger than the labor cost (Rs.100 per day), up to Rs.1,000, but the punishment varies depending on the conditions. Pilfering water happens mainly if farmers open the sluice at night to irrigate their fields or if they break field bunds to obtain water from fellow farmers' fields. The violators are fined up to Rs.1,000, but in Meenachipuram they are asked to bear the electricity cost for the temple for a year and in Silaimalaipatti the cost of the *Oor Kavalan* (god to protect the village) temple celebration or the *Madai Pongal*. In Silaimalaipatti, in addition, if farmers who encroached on land in the tank foreshore damage the surplus weir to release water from the tank in order to save their crops from submergence in water, they get a penalty of prohibition of cultivation for one year.[24] Cutting trees in the tank bund and unauthorized grazing in paddy fields are also penalized. The *Neerkatti* is empowered to catch straying animals and bring them to the village common place. The owner of the animal has to pay compensation or fine, and only after that is he allowed to take his animals back.[25]

22) By contrast, the government-managed system has no effective sanction system mainly because of the lack of field level staff responsible for constant monitoring. PWD has field staff called *laskar*, but they never come to the tank except in case of emergencies such as breaching of tank bund. In our study villages, three tanks are managed by PWD but the villagers did not know about *laskar* at all. In the case of PU tanks, there is no position at the field level. In any case, the government officers and staff have no incentive to keep an eye on monitoring tank resources because their salary does not depend on the performance of tank irrigation.

23) It should be noted, however, that the informal leaders, mostly upper-caste people with a hereditary system, sometimes favor their relatives and friends and harass their rivals. As actually happened in Kadaneri in the past, even though the *Neerkatti* reported a case of upper-caste landlord's pilfering of water, the inquiry committee's conclusion was that the *Neerkatti* was drunk while on his monitoring job, as claimed by the landlord. Also, upper-caste large farmers who violate the rules sometimes ask their permanent labor to take the fall for the crime in order that they themselves may escape the sanction. Since large farmers often have diversified resources and do not depend merely on tanks, even if they receive the severest punishment such as ex-communication or social ostracism, it had relatively little effect on them. Such problems have often damaged the reliability of the tank institution. Mosse [2006] also reported that the *Neerkatti* was not allowed to report complaints against upper-caste landlords when the latter was at fault and caught by the *Neerkatti*.

24) Nowadays, however, damaging the surplus weir in order to avoid submergence of the field in the foreshore is not strictly monitored and sanctioned as before.

25) Sometimes the *gram panchayat* asks the violator to pay the fine to the *panchayat*.

Table 7 Remuneration for Informal Irrigation Functionaries in the Study Villages

Position	Remuneration
Nattamai/Maniyam/Ambalam	No
Kaladi/Kanakkupillai/Pokkistari	Rs.250–500 per year
Neerkatti/Kaval/Kudumban	8 *padis* or 4 *marakkals* of paddy per acre per season Preference in lease-in temple land and tank bed
Thotti	4 *padis* or 2 *marakkals* of paddy per acre per season Free meal during work

Source: Field survey in June 2008.
Note: 1 *padi* = 1.25 kg; 1 *marakkal* = 4.5 kg, the farm gate price of paddy was Rs.710 per bag (73 kg) in June 2008.

The existing remuneration for the irrigation functionaries in the study villages is presented in Table 7. The remuneration for the service of *Neerkatti* was 10–18 kg of paddy per acre per season, which was equivalent to Rs.3,000–5,300 (if he irrigated 30 acre) or Rs.4,900–8,800 (50 acre).[26] Since the working period was approximately 3 months in a season, *Neerkattis* were paid more or less equal to the prevailing wage rate (Rs.100 per day). Apart from the remuneration, *Neerkattis* were given preference in leasing the temple lands for cultivation. They also used to enjoy the benefits from the fisheries and trees in the tank bund, but by the time of our survey, such a custom had totally disappeared in the study villages.[27] The wage rate for *Thotti* was half of the remuneration for *Neerkatti*. They are, however, provided with free meals during work. The other two upper- and middle-level irrigation functionaries received no salary, although they were eligible for travel allowance for the public cause.

Table 8 is a summary of gross revenue, production cost and net profit of paddy production in S *Gram Panchayat*, Thrimangalam *Taluk*, Madurai District, for the year 2006. A total of 27 paddy-producing farmers in the tank *ayacut* (*nañcai*) area were interviewed by the authors, but reasonable answers were collected from only 22 farmers. They were divided into three categories: farmers who irrigated by tank water only,[28] those who irrigated by tank water and purchased well water, and those who irrigated by tank water and owned well water. The table shows that the farmers who used only tank water obtained

26) If the entire command area in the all the study villages (644 acre in total) are cultivated, one *Neerkatti* would have the opportunity to work for an average of 54 acre.

27) One of the *Neerkattis* in Kadaneri Village mentioned that earlier, there was a custom to lease out trees in the tank bund and the informal leaders gave priority to him, but at present the custom is not practiced since rights to trees, fishes and other tank related resources have been almost neglected. One of the reasons behind this is that revenues from the tank assets are shrinking over the years due to mismanagement, and the *Neerkattis* have lost their incentive to guard the assets. Another reason is the tendency to see the tank irrigation system from a narrow viewpoint, merely providing water for field crops rather than recognizing many different uses of it [Bakker *et al.* 1999]. It should be mentioned, however, that appointment of guards is still quite common in the tank system in India, compared to the canal irrigated areas [Bardhan 2000].

28) One farmer who purchased well water for the nursery is included.

Table 8 Cost and Return of Rice Production

	Only Tank Water		Tank+Purchased Well Water		Tank+Owned Well Water		Total	
No. of sample	7		9		6		22	
No. of well owners	2		0		6		8	
Yield (bag/acre)	31		31		29		31	
Gross revenue (Rs./acre)								
Paddy	12,362		12,503		11,718		12,244	
Straw	86		200		150		150	
Total	12,448		12,703		11,868		12,394	
Cost (Rs./acre)								
Current input								
Seed/Seedling	589		768		661		682	
Fertilizer	2,218		2,203		1,869		2,117	
Chemical	442		244		157		284	
Sub-total	3,249		3,215		2,687		3,083	
	9,199		9,488		9,181		9,311	
Value-added								
Animals and machineries								
Power tiller	1,007		1,146		1,288		1,141	
Bullock	253		305		311		290	
Well irrigation	71		1,935		N.A.		1,120	
Combine harvester	1,410	0	1,300	0	1,856	0	1,743	0
Sub-total	2,741	1,331	4,686	3,386	3,455	1,599	4,294	2,551
Human labor								
Nursery	55		80		31		58	
Land preparation	1,787		2,102		2,009		1,976	
Transplanting	1,154		1,195		1,258		1,199	
Fertilizing	101		141		133		126	
Weeding	489		940		885		782	
Harvesting and Threshing	0	1,072	0	1,795	0	2,087	0	1,502
Sub-total	3,586	4,658	4,458	6,253	4,316	6,403	4,141	5,643
Net profit (Rs./acre)	2,872	3,210	344	–151	1,410	1,179	876	1,117
% of net profit to gross revenue	23.1	25.8	2.7	–1.2	11.9	9.9	7.1	9.0

Source: Prepared by the authors, based on survey in S *Gram Panchayat* in June/July 2007.

a fairly good profit (around 23–26% of gross revenue on average), but the other farmers who used tank and well water got almost no profit,[29] although those who used owned well water got a small profit if the cost of well irrigation is considered zero.[30] What should be mentioned here is that payment to a

29) At first glance, it might seem contradictory that the farmers who used only tank water obtained much higher profit than those who used both tank and well water, but it can be surmised that the former farmers' paddy fields were located in a better position in the *ayacut*, and could thereby use tank water sufficiently and in a more timely manner.

30) Electricity charge for well irrigation is free in Tamil Nadu, but the capital cost and labor cost necessary for well irrigation are not factored in.

Table 9 Execution of Works by the *Neerkattis* in the Study Villages

Roles	Koovala-puram	Meenachi-puram	Kada-neri	Silaimalai-patti	A. Parai-patti	Jariusilam-patti	Sittuloti
Mobilizing labor for common works			Yes		Yes		Yes
Sluice operation			Yes		Yes	Yes	Yes
Water management					Yes	Yes	Yes
Dispute moderation between farmers			Yes		Yes	Yes	Yes
Informing emergency	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Irrigation during water scarcity			Yes		Yes	Yes	Yes
Maintenance of tank bund			Yes		Yes	Yes	Yes
Collection of common fund			Yes		Yes	Yes	Yes
Sluice maintenance							
Watch and guard tank assets							
Announcer					Yes	Yes	Yes
Organizing religious ceremony	Yes		Yes	Yes	Yes	Yes	Yes

Source: Prepared by the authors.

Neerkatti and a *Thotti* is 12 *padis* or 6 *marakkals* in total per acre per season, which is equivalent to only Rs.83–150 per acre.[31] From the farmers' viewpoint, payment to the lower irrigation functionaries is very marginal, if we compare it to the price of well water (Rs.50 per hour).

IV Determinants of Performance and Causes of Deterioration of Informal Tank Institution in the Study Villages

First, we made an attempt to assess the performance of informal tank institution in each study village, by the actual working status of *Neerkattis* (Table 9). If we make a judgment on the performance,[32] we find that it was relatively good in Kadaneri, A. Paraipatti, Jariusilampatti and Sittuloti, but not so good in Koovalapuram, Meenachipuram and Silaimalaipatti.

As the table shows, even in the three villages with malfunctioning tank institution, the *Neerkattis* were still working in emergencies (such as breaching of tank bund) and in the religious ceremony (because it is prestigious for them).[33] On the other hand, even in the remaining four villages with

31) The farm gate price of paddy at the harvesting time (January 2007) was around Rs.400 per bag, much lower than the price (Rs.710) in June 2008 as mentioned in the note in Table 7. One of the reasons is the seasonal fluctuation of rice price, which usually registers the lowest just after the harvesting and gradually rises thereafter.

32) Among the 12 roles in Table 9, those villages where *Neerkattis* executed at least 7 roles are classified as relatively well-functioned and others are non-functioning.

33) After the celebration the *Neerkattis* are also eligible to get coconut, fruits and other edibles that are offered to the god.

relatively well-functioning institution, sluice maintenance and caring tank assets were not carried out in any villages, and even mobilization of labor for common work was not undertaken in Jariusilampatti. Let us now explore the reasons why the tank institution is malfunctioning in comparison to some other particular villages.

The *Neerkattis* have been playing a key role in the informal tank institution. Traditionally, however, they were selected from the *Pallar* caste, one of the most dominant SCs in the study area, and the position was basically hereditary.[34] As a result, if there were no *Pallar* caste families in the village, *Neerkattis* were recruited from nearby villages, such as the case of Meenachipuram and Silaimalaipatti (as indicated in Table 3). Withdrawal of *Neerkattis* from their job responsibility, if it happens, therefore, becomes a decisive factor in the deterioration of the informal tank institution. It can happen more easily in villages without a *Pallar* community.

In the case of Silaimalaipatti, the *Neerkattis* had been employed from a nearby village for a long time, but after the 1970s the *Pallar* community from the village started to hesitate to work as the *Neerkattis* and finally stopped working, since they had purchased land in the foreshore area of the tank and began farming themselves by utilizing their own wells. In the meantime, the supply channel of the tank was blocked by the construction of check dams, which drastically reduced water supply to the tank. In the absence of the *Neerkattis*, the challenge of sharing limited water equally among the *ayacut* farmers created conflict, which ultimately led to the dismantling of the tank institution. The reduction of water supply to the tank deprived the farmers of their motivation to come together for common work, and such a situation was aggravated by the absence of *Neerkattis*. In Meenachipuram as well, the *Neerkattis* had been employed from an adjacent village (K. Pudupatti) where the *Pallar* community was dominant. Meenachipuram was dominated by a community called *Yadava* (*Konar*), a backward caste (BC), but they enjoyed upper social status compared to the *Pallar*. The *Pallar* farmers in K. Pudupatti Village had land in the foreshore of the Meenachipuram tank. During the 1990s the Meenachipuram farmers filed a complaint to the revenue office that the K. Pudupatti farmers had encroached on the catchment area and supply channel. However, finally, as a countermeasure, the *Pallar* community in K. Pudupatti requested the *Neerkattis* to withdraw from the Meenchipuram tank, which led to the rapid deterioration of the tank institution. Under such circumstances, an "innovation" was made in the method of selecting *Neerkattis* in Silaimalaipatti and Meenachipuram since 1996. They decided to select *Neerkatiis* from

34) According to the *Neerkatti* from Jariusilampatti Village, when he arranged the marriage of his daughter with a local groom, he was demanded dowry by custom in the form of money or kind (gold and household utensils), but since he could not fulfill the aspirations of the groom, he decided to give his *Neerkatti* status to him. This narration would give us an idea that once the *Neerkatti* profession was considered as a valuable asset.

willing households in each village, although the reluctance to become *Neerkattis* and the lack of knowledge on norms and practices often made it difficult to find appropriate persons. The selected *Neerkattis*, however, do nothing other than dealing with emergencies and organizing the religious ceremony, as shown in Table 9.[35] Such an "innovation" despite such a problem, is bound to pave the way to reduce caste-based selection of *Neerkattis* and the concomitant discrimination.

Recently, however, even in the villages with *Pallar* community, there have been increased conflicts between *Pallar* and the other dominant castes, which led to the deterioration of the tank system. In some villages, even if the dominant *Pallar* community selected their leaders, the other upper-caste people often did not accept their leadership as in the case of Koovalapuram and Kadaneri (*Reddiyar* in Koovalpuram and *Gounder* in Kadaneri refuse to accept *Pallar*'s leaders).[36] Apparently this was an important factor in the malfunctioning of the tank system in Koovalapuram; although farmers could have received enough water since the tank is located in the head of the chain, they actually failed to do so because even though the *Pallar* caste occupied 50% of the households, they refuse to do the *Neerkatti*'s work, owing to the poor understanding and status *in quo* between the two competing caste groups.

The SC people, including *Pallar*, have become more empowered and independent than before. However, caste discrimination continued to exist in India (especially in south India), including our study villages, and conflicts between caste communities happen more frequently nowadays. Since "exit" options are available to the SC people, such conflicts can more easily result in the withdrawal from work of lower irrigation functionaries such as *Neekattis*. This is simply because the numerical strength and strengthened economic status of SC help to free them from atrocities but fail to lead to the improvement of their social status.[37] The upper-caste people still adopt an authoritarian attitude over lower caste and lower-caste people are constantly trying to keep away from the armpits of the upper-caste. Thus they complain of each other without recognizing their common benefit; this is usually the starting point of disaggregation of the informal tank institution. Despite a remarkable continuity of economic and

35) But they are provided with monthly salary of Rs.1,500 for 3 to 6 months till the end of the tank season.

36) Sakthivadivel *et al.* [2004] also documented that a *gram panchayat* in Sivagangai district had representation from all the caste groups except SC, and SC people were not allowed to participate in decision-making in tank-related issues. Especially notable is that it was selected as the best *panchayat* and received the Nirmal Puraskar Award in 2008 from the President of India. Until the government treats the caste discrimination issue more seriously, the upper caste's actions against SC will not terminate (http://nirmalgrampuraskar.nic.in/nirmalgrampuraskar/index.jsp).

37) While the law states that all the citizens have equal status, status is actually determined by the caste group he/she belongs in rural India. Discrimination and injustice against SC people are being practiced in various forms. For example, in September 2008, a Vice President of a *gram panchayat* of Madurai District was murdered simply because he tried to open the sluice and irrigate his field before the upper-caste farmer's field. See also Rajangam [2008], Venkadesan [2008], Ramasamy [2008] and Ramaiah [2000].

political dominance of upper-caste people, many are now facing challenges from the SC people, who have been subordinated for a long time.[38)]

Another important reason behind the deterioration of the informal tank institution is mismanagement by the government, especially PWD, which adds another explanation of why the informal tank institution in Koovalapuram Village malfunctioned. The Koovalapuram tank was one of the tanks selected for the tank modernization program of European Economic Community (EEC) in the second phase during 1989–95. It was implemented in two phases. In the first phase (1989–91), major repair works were conducted to improve existing tank structures. In the second phase (1993–95), tank sluices were modernized and distribution channels were partially lined. Since establishment of formal Water Users' Association (WUA) was mandatory for this program, officials from PWD formed a totally new WUA without considering the existing informal institution. During implementation of the program, PWD gave importance to the WUA while the informal authorities did not cooperate with the newly elected WUA. Once the program was completed, however, PWD ceased to show any interest in maintaining the WUA and over the period, both the informal and formal systems disintegrated. At the time of our survey, although five families of *Madaiyan* (*Neerkatti*) lived in the village, they were not doing their work since there was no guarantee of remuneration.

When *Neerkattis* withdraw their services, operation of sluices becomes everybody's business and nobody's responsibility. Farmers tend to assert *de facto* individual control over water and leave the sluice always open, which often results in serious problems such as inequalities among farmers and acute water shortage in the later stage of crop season (resulting in serious crop losses),[39)] as Mosse [2006] also pointed out. They do not even follow the simple procedure of closing the sluices during the rainy days or at night.[40)] The *Neerkattis* still play a major role particularly when the tank receives below-

38) We note a new tendency in the study area. In some villages, the upper-caste landlords and farmers are gradually changing their attitudes and trying to cooperate with SC communities, acknowledging the latter's importance under the changing social norms and values. Oppression of the lower caste by the upper-caste is actually loosening after some interventions by the government. With the help of government reservation policy and other programs, lower-caste people acquired education in the cities and slowly built up their assets. This development has gradually reduced the dependency of lower-caste people on upper-caste landlords for obtaining employment opportunities. The abolition of *Zamindar* (1957) and land distribution to the landless by the government in the 1960s also had an impact. However, the upper-caste people view this process as an empowerment of lower caste at the cost of embarrassing the upper-caste.

39) Damage estimates are provided by some studies. For example, it was estimated that rice yield was reduced by 60% due to inadequate and unequal water distribution in tank irrigation [Palanisami 2000]. Sakthivadivel *et al.* [1982] also estimated that water use efficiency in south Indian tank system is lower by 25–36% mainly due to inadequate maintenance and lack of control over the sluices.

40) In the remaining four study villages, night irrigation is prohibited and the sluices are opened at 6 a.m. and closed at 6 p.m. If night irrigation is practiced, water often overflows and is wasted because farmers usually direct water to their fields but do not monitor the progress of irrigation.

normal rainfall. They work as a water manager in tank irrigation. Even though they have no scientific knowledge, they can judge available tank water, and the timing and amount of water which should be released from the sluice very well. In water shortage years, they are asked to provide direct irrigation in order to assure equal water distribution. In general, a successful local tank system adopts various ways to augment water supplies to the tanks, as already explained in this article.

Lastly, let us mention some observable effects of energized wells in our study villages. Well owners can usually start rice cultivation earlier than the non-owner farmers, particularly by starting to raise the nursery earlier through the use of groundwater. This means that they are ready for transplantation when the sluice is opened. If farmers without wells have to wait until the sluice is opened they have to start raising the nursery at the same time, which leads to labor shortage in every paddy cultivation stage thereafter. So as to avoid such problems, at present, in all the study villages, the sluices are opened before the *Madai Pongal* to enable non-well-owner farmers to start raising the nursery earlier. However, although the symbolic meaning of the *Pongal* has vanished, it is still practiced in every village.[41] Another minor effect of the diffusion of energized wells is a tendency for the rotational system of irrigation not to be practiced as before in many cases, since most of the tail-end farmers have already left the land fallow (because of water shortage) and few of them claim their rights, since they are afraid to do so. Since irrigation wells are usually owned by large farmers and their fields are also usually located in the head-end, if tail-end farmers do claim, the large farmers will refuse to provide supplementary water to save their crop by using wells when the tank fails in the later season.[42]

V Current Status and Perceptions of *Neerkattis* in the Study Villages

Table 10 provides summary data on the present occupational position and (rough) income estimates of 31 *Neerkattis* interviewed in the study villages. The table confirmed that practicing as *Neerkattis* alone would not be feasible and hence these *Neerkattis* have already diversified their income sources to land cultivation and/or agricultural and non-agricultural labor. Moreover, more than one third of the *Neerkattis* (39%) were not doing *Neerkatti* work at all, and they earned a higher income than their counterparts who opted for a combination of *Neerkatti* work and other work.

41) In addition, the recent rapid diffusion of combine harvesters in the study area due basically to the hike of agricultural wages caused the decline in the custom of celebrating the *Kathiraruppu Pongal*, since the opportunity for the laborers has been lost due to the technological innovation.

42) However, in reality, while well-owner farmers can save their crop by well water, due to the low density of wells in the *ayacut* (usually only one well for 30 acres) most of the non-well owner farmers cannot save their crop. Such a problem drastically reduces the yield of rice and thereby the remuneration for the *Neerkattis*.

Table 10 Occupations and Rough Income Estimates of the *Neerkattis* in the Study Villages

Occupational Pattern	No. of the *Neerkatti*	Share (%)	Income as *Neerkatti* (Rs.)	Income from Land Cultivation (Rs.)	Income from Agricultural Labor (Rs.)	Income from Non-Agricultural Labor (Rs.)	Total Income (Rs.)
Only *Neerkatti*	0	0	–	–	–	–	–
Neerkatti + Cultivate own land	6	19.4	6,500	5,980	–	–	12,480
Neerkatti + Leased-in land for cultivation	4	13.0	6,500	3,610	–	–	10,110
Neerkatti + Agricultural labor	9	29.0	6,500	–	6,615	–	13,115
Agricultural labor + Non-agricultural labor (Not doing *Neerkatti*'s work)	12	38.7	–	–	6,615	7,935	14,550
Total	31	100					

Source: Field Survey in June 2008.

There were 31 *Neerkatti* families in the seven study villages for operating 12 sluices and thereby every family gets the opportunity to work as *Neerkatti* once in three years on average. Almost all of them opined that the annual remuneration of around Rs.10,000 would suffice if tanks perform well and farmers are willing to pay their due without fail. However, recently the *Neerkattis* are always in danger of losing their income completely in the case of droughts (monsoon failure).[43] Tanks often perform poorly and most of the farmers leave their land fallow and some farmers, especially the well-owner farmers, hesitate to pay the remuneration to *Neerkattis*.

In some villages, on the other hand, the *Neerkattis* are paid some amount of cash even when the crop fails. The payment is not enough to compensate for their wages but it would provide the *Neerkattis* with some hope. It also provides security and a sense of satisfaction for the *Neerkattis*, who can take pride in their jobs, as reported also by Seenivasan [2003]. Through interviews, we found that the *Neerkattis* were not satisfied with their job, not only because of reduced remuneration but more importantly because of the reduced respect they received from the fellow farming community. They felt that nowadays the masters are many and everyone wants to rule them, but nobody is ready to take responsibility for paying them. They are also often involved in quarrels with farmers about their work performance.

Finally, we summarize the *Neerkattis*' perceived incentives and disincentives to do work as

43) In the study villages, nearly 30% of land was left fallow and actual area cultivated was about 450 acre against total command area of 644.5 acre. Hence the *Neerkatti* would only have an opportunity to operate an average of 37.5 acre and as a consequence he earned only 9.24 bag of grain, worth of Rs.6,560. So the revenue loss would be about Rs.3,380 (approximately 34%).

Table 11 Incentives and Disincentives of the *Neerkattis* in the Study Villages

Incentives	Disincentives
Assured employment opportunities for 3–6 months	Undignified treatment received from upper-caste farmers
Preferences for leasing temple land	Difficulty in collecting remuneration from farmers
Priority in leasing tank assets	Exploitation of labor
Honor during religious ceremony	Uncertain employment due to uncertain tank filling
Exempted from contributing to common fund*	Violation of rules by fellow farmers
	Day and night work

Source: Field survey in June 2008.
Note: * No need to pay water user fee even if he has land in *ayacut* and also exempted from festival fee.

Neerkattis (Table 11). The table shows that in addition to the problem of their low and unstable income such as "uncertain employment due to uncertain tank filling" and "difficulty in collecting remuneration from farmers," the problem of their low social status such as "undignified treatment received from upper-caste farmers" and "exploitation of labor" is an important disincentive.

Concluding Remarks

After presenting our basic idea regarding the factors and mechanism behind the recent deterioration of the village-level informal tank institutions in Tamil Nadu, India (Fig. 1), based on data and information from our field survey in seven tank-benefitted villages in Madurai District in 2008, the actual situation of tank irrigation and tank institution at present were presented in this article in a detailed and comprehensive way. One of the most important factors is related to the physical deterioration of tanks such as encroachment of tank foreshore, malfunctioning supply channel and siltation of tank bed, all of which led to reduced water supply and storage in tanks. Another important factor was reduced dependence on tanks for irrigation because of the emergence and development of energized well irrigation. Because of this, farmers with wells were reluctant to participate in common work for tank maintenance and to pay *Neerkattis* for their services. However, it can be concluded that the most fundamental reason was the overall economic development and urbanization in rural Tamil Nadu, especially after the mid-1990s. With the accelerated shift of labor forces from agriculture to non-agriculture (as shown in Sato [2011] in this special issue) and the associated surge in wage rates in rural areas, interest is rapidly shifting from agriculture to non-agriculture in general and tank management in particular. In other words, the present phase of economic development in Tamil Nadu can be characterized as a transition from a labor surplus to labor shortage economy, which has profound implications for the hitherto basic structure of rural India.

In this context, special emphasis was placed in this article on the contradiction between the traditional caste-based governing system of tanks and the recent rapid socio-economic development and urbanization, and the resulting upward mobility in economic status of low-caste people. Therefore, the current status and the perceptions of *Neerkattis*, the key persons in informal tank institutions who have been selected from scheduled caste families in a hereditary system, were investigated in detail based on information obtained through interview with 31 *Neerkattis* in the study villages.

Reduced remuneration and unfair treatment received by the *Neerkattis* based on their caste provided enough reason to show their reluctance towards their traditional profession. And, in the absence of *Neerkattis* the field-level tank water management became very difficult since all the *ayacut* (tank command area) farmers tended to operate the sluices by themselves whenever they needed water. Sluices often remain open even in rainy days or at night, thereby leading to severe water wastage and resulting in an increase in fallow land due to the water shortage as well as reduced rice yield in the cultivated field.

The situation was better in the villages where *Neerkattis* were still working, but it was found that the effectiveness of the monitoring and sanction system in informal tank institutions has diminished over time. We observed increased disputes among farmers as well as between farmers and *Neerkattis*. Participation of farmers in common works to maintain tank structures such as cleaning supply channels was also reduced. An increased reluctance to pay remuneration to the *Neerkattis* among farmers, especially those who owned irrigation wells, was also observed. All of these unfavorable situations deprived the concerned SC families of incentives to work as *Neerkattis*. As a result, more than one-third of the 31 *Neerkatti* families in the study villages already quit their traditional job, and no *Neerkatti* family depended entirely on their traditional profession.

Apart from problems of low and unstable income of *Neerkattis*, problems also arise from the continuing low social status of the *Neerkattis*. Their low caste has become less tolerable for *Neerkattis* than ever before. Behind this, there are of course the recent rapid socio-economic changes experienced in contemporary India. Tank irrigation is thus facing a big challenge from the fundamental contradiction between the rapid economic development and transition to a modern industrialized society in India, on the one hand, and the traditional hierarchical tank governing system, which has been based on caste in India for a long period, on the other hand.

Whither the tanks in south India, including our study area in Tamil Nadu? A strong tendency is that more and more tanks are going to be abandoned and used only for recharging groundwater as percolation ponds, serving well irrigation [Palamisami *et al.* 2010], although there is a serious problem of inequity between farmers with and without wells. One possible solution may be the increased role

of the government in tank management, including maintenance of tank structure[44] by using labor through the National Rural Employment Guarantee Scheme (NREGA) and employment of *Neerkattis* by the government. The latter issue of employment of *Neerkattis* by the government may not be easy at all, but we can recognize at least that the community based resource management system cannot be accepted in India any more if it depends on the continuous subordination of lower-caste people, especially SC people.

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44) Therefore, "so far, programs to turnover tank irrigation systems to farmers in Tamil Nadu have been undertaken only on an *ad hoc* basis, often through NGOs" [Mosse 2003: 268]. Regarding the investment to tank repairs and maintenance, on the other hand, due to budget constraints in both the PWD and the PU, "during the 1980s and 1990s major investments in Tamil Nadu tanks were made under the EEC (European Economic Commission)-funded program of tank development" [*ibid.* 276], although its impact seemed to be insignificant [Palanisami *et al.* 2008].

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